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CEREBRO-SPINAL CONCUSSION.

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THERE is hardly a subject in medical jurisprudence concerning which greater confusion and more erroneous ideas prevail in the mind of the medical profession than exist with regard to cerebro-spinal concussion. The reasons for this are not far to seek. At present there are in the English language, so far as I know, only three systematic treatises upon this subject. That of Erichsen was written over twenty years ago, and contains many errors. Page's work was so evidently written to combat Erichsen's as to be untrustworthy. The recent treatise of Clevenger, of Chicago, on this subject, while admirable in many respects, is at times obscure and prolix.

Valuable articles have appeared from time to time in the medical journals; but these are well-nigh inaccessible to the great mass of the profession. Another reason for the mistiness of the medical mind in this direction is the plentiful lack of instruction in neurology in our medical schools; for there are not half a dozen in the country in which instruction in this department amounts to more than a semi-occasional clinical lecture.

A case which excited considerable interest in this State was pronounced to be spinal concussion for the very novel

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Read by title to the Mississippi Valley Medical Association, Oct. 11, 1890.

reason, that when the blade of a penknife was stuck into the sole of the foot, the patient did not wince.

A prominent specialist in other lines informed a young lady of my acquaintance that the way to detect feigned spinal concussion was to have the patient cross his legs, and when he was not looking for it, to strike him on the patellar tendon. If his foot kicked he was a malingerer. Surely the early neurological education of these gentlemen had been sadly neglected.

I propose in this paper to present as briefly and clearly as I can the modern idea as to what constitutes cerebro-spinal concussion.

First, concerning the name. Cerebro-spinal concussion seems to me the most appropriate term for the condition under discussion. *A priori* it is almost impossible to have spinal concussion without cerebral concussion. Moreover, the symptoms of this condition are largely cerebral, as we shall see. Seguin prefers the term "traumatic neurosis," but this seems somewhat too indefinite. He admits, besides, that there may be no trauma, strictly speaking; and it is by no means established that it is merely a neurosis.

Clevenger has proposed to call it "Erichsen's Disease;" but this manner of naming affections is objectionable on many grounds, and neurology is already overburdened with such appellations.

As to the etiology of this complaint, it occurs most frequently, but by no means exclusively, from railway accidents. When one thinks of the tremendous force which rives oak and steel to splinters, when one views the hurly-burly of a railway wreck, the great wonder is that there are not forty times more cases of cerebro-spinal concussion than there are.

What are the predisposing causes to cerebro-spinal concussion? Very little is said on this subject, yet manifestly there must be some such causes; for out of the hundreds of people who are jolted up in railway and other accidents, very few develop this condition.

Putnam makes the following statement, in a paper entitled "The Medico-Legal Significance of Hemianæsthesia after Concussion Accidents": "Neither is a very neurotic temperament a necessary condition. In only one of these cases was this present to any marked degree."

Out of sixteen cases where any mention is made of the state of health previous to the accident, eleven were perfectly healthy and five were neurotic. I have myself had a number of cases in which there was no family nor personal neurotic history.

Seguin says: "The escape of persons who are asleep at the time of a railway accident from the symptoms of traumatic neuroses is admitted by all writers, and should exert a powerful influence on our judgment of the pathology of the affection." Clevenger disputes this, and quotes two cases of his own in which cerebro-spinal concussion occurred during sleep.

Charcot alludes to the fact that slight accidents may serve to bring on apparently severe symptoms in those predisposed to neuroses.

Oppenheim is inclined to attach some importance to alcoholism as a predisposing cause. Rigler thinks that railway officials are predisposed to the development of cerebro-spinal concussion by the constant jar to which they are subjected. There are no statistics on this point.

Auto-suggestion plays a prominent part in the etiology of this affection; these patients are as prone as a hysterical woman to take on suggested symptoms.

Seguin has called attention to the injurious influence of sympathetic care and coddling.

The physician should bear it in mind that railway accidents are by no means the exclusive cause of this condition. This caution is not a superfluous one, for I have known of a number of cases in which the physician groped about blindly and gave far too favorable a prognosis, simply because there was no history of a railway accident.

There is nothing *sui generis* nor pathognomonic about the symptoms of cerebro-spinal concussion. A fairly good imitation may be produced by the prolonged use of the bromides. Without the history of the accident no one could tell that there had been one. The symptoms vary so much that it is hardly possible to describe a typical case. It is an absurdity to talk about making the diagnosis in these cases from the objective symptoms alone. No mortal man can do so.

A convenient division of the symptoms is into cerebral and spinal.

Under the head of cerebral symptoms, we notice a state of depression, brooding hypochondriasis, loss of the power of voluntary attention. This last symptom is usually well marked and characteristic. Any effort requiring fixation of the attention for longer than a few minutes is exceedingly irksome and is apt to induce unpleasant head paræsthesiæ, such as a sensation of a tight-fitting cap or a dull, indescribable discomfort. Insomnia is nearly invariably present.

Speech is more or less impaired, varying from slight hesitancy to a condition of mild amnescic aphasia.

The patient becomes peculiarly susceptible to the influence of alcohol; in my experience it produces an unpleasant effect, a dull sense of confusion and discomfort.

There is a state of psychical sensitiveness and morbid emotionalism. The sight of a funeral or the account of an accident will throw these patients into profound despondency.

Impairment of memory is a very constant symptom. This impairment is most pronounced with regard to recent events. The patient will usually remember all the minute details of the accident, and will repeat them over and over to you at every visit.

There are certain symptoms which may be either cerebral or spinal in their origin. These are: hemianæsthesia, analgesia, — hyperæsthesia, — hyperalgesia, — paræsthesia, which are probably cerebral, and general muscular lassitude, which is probably spinal.

Among the purely spinal symptoms are: girdle sensation, disturbances of the gait (slight incoördination, dragging of affected leg), disturbances of the bladder and rectum (not often marked), and of the sexual functions, rigidity of the spine, etc. These symptoms are found in all possible varieties of combination and degrees of intensity; none of them is in any sense pathognomonic of this condition. One should take a bird's-eye view of these cases. Only one who has had considerable experience in dealing with other forms of nervous disease can appreciate the *tout ensemble* of the symptoms. The general practitioner usually loses the perspective effect of the whole by viewing the case too nearly. He pins his attention to a few prominent symptoms, and overlooks, generally through ignorance, a whole host of others. It is as if one should attempt to obtain a correct idea of a large and irregular building by getting very close and carefully examining the front door.

The pathology of this affection is as yet perfectly obscure. Nothing is more fascinating or more fallacious than *ante mortem* theories of neural pathology. Few *post mortems* have been held, and they have thrown no light upon the subject.

Erb is inclined to consider it due to "molecular disturbances," whatever that may mean.

Some have thought that there is a slow interstitial increase of connective tissue throughout the cord.

Seguin considers it a neurosis.

The most likely hypothesis is that advanced by H. Fischer, advocated by Scholz, and recently worked out in detail by Clevenger, viz.: that it is due to disturbed vaso-motor innervation of the brain and cord. Erb says that "it is hard to understand why, in so severe a shock, the vascular nerves alone should be paralyzed, to the exclusion of the other nervous elements." But this is merely an *a priori* objection, such as might readily be urged against any view that might be advanced. It remains true, however, that there be "vaso-motor cranks" who attribute everything under the shining sun to some "vaso-motor disturbance."

Concerning the diagnosis of this affection, given the history of an accident, it should be remembered that a number of conditions may result. These have been admirably summarized by Seguin in the following table:

Injuries to the nervous system without evident gross lesions; physical and psychical shock.	Immediate symptoms.	1. Transitory paralysis. 2. Diabetes. 3. Amnesia.
	Later or secondary symptoms.	4. Traumatic neuroses. (a) Psychic. (b) Hysteroid and neurasthenic. (c) Local or neural. 5. Paralytic and atrophic symptoms (sclerosis and progressive muscular atrophy); dementia paralytica; epilepsy. 6. Pott's disease of the spine; cerebral tumors. 7. Malingering.

It would be well to keep this table before one when examining a case of this sort.

One very serious hindrance in diagnosing these cases is the large number of erroneous statements contained in the works usually consulted. Especially is this remark true of treatises on surgery. A bull in a china shop is not a marker to a surgeon dealing with a neurological question. Erichsen describes many cases which are not at all neuroses. This fact seems to me an insuperable objection to Clevenger's proposal to call this affection "Erichsen's disease." To do this would be to throw everything into hopeless confusion and to do away with the results of all the investigations of the last twenty-five years along this line; for every physician who had a case in the least like any one of those described by Erichsen, would immediately pronounce it to be "Erichsen's disease."

As to the electrical diagnosis, it is sufficient to remember the dictum of Strümpell, that in this affection the electrical reactions are merely quantitatively altered. When they become qualitatively altered you have some other condition to deal with.

In conclusion, by way of showing what is and what is not cerebro-spinal concussion, and how closely it may be simulated by other affections, I will report some cases that have come under my observation:

CASE I. (Reported in the "Medical Progress," March, 1890.) Captain C., a fireman, while at a fire, was standing on a ladder helping to direct the nozzle of a hose. One of his subalterns let go the hose, and the nozzle struck the captain immediately over the right eyebrow, inflicting a horizontal wound about an inch and a half in length. The water passes through the hose of a fire-engine with considerable force, three or four men being required to direct the stream, so that the blow was a severe one; nevertheless, he was not knocked off the ladder nor rendered unconscious. He came down from the ladder and walked a few squares to the office of a physician, where the wound was sewed up. Feeling no ill effect from the blow, except that he was somewhat stunned, he wanted to go back to the fire, but at the advice of the physician he returned home. The wound healed readily, and in a few days everything was going on as usual.

About five months after the accident a train of obscure nervous symptoms set in. He was restless in his sleep; he could not fix his attention on anything long without causing an unpleasant sense of fullness in his head; he felt as if thousands of insects were crawling up his left leg; he did not like to go about in the evening, because he "did not feel sure of himself after dark."

One day as he was riding to a fire, he suddenly became completely hemiplegic, and came near falling off the platform of the fire-engine. There was complete loss of motion and sensation in the left side, extending to the face and head. This lasted a few minutes and then disappeared as suddenly as it had appeared. After this he had these attacks quite frequently. Sometimes he would have several of them in a day, and then he would not have one for a week. They never lasted over twenty minutes, and consciousness was never in the least affected during them. He described to me the curious sensation of waking up in the night and feeling as if half of his body were gone and crawling over in the bed hunting for the missing half. He came under my treatment about a year and a half after the accident, through the kindness of Dr. Underwood. At first sight he had every appearance of health; he was ruddy in color and was a fine specimen of physical development. But on examining him more closely, I noticed a certain indescribable look of vacillation and incertitude in his eyes, which I believe is quite characteristic of such conditions. He seemed incapable of looking at me steadily for any length of time; his eyes would falter and his glance would fall. At this time he no longer had the singular hemiplegic attacks. His pupils were somewhat dilated; they were even and responded well to light. The patellar reflex was slightly exaggerated. He staggered in his walk and had a tendency to gravitate toward the left. There was no wasting of the muscles and no abnormal disparity between the right and left sides.

Mentally he was in a state of mild chronic depression and hypochondriasis. His face wore a constant look of vague foreboding. There was still some incoördination; on rising from a chair he would spread his feet apart and sway slightly before starting off. Vesical, rectal and sexual functions normal. He was still unable to fix his attention on anything for long, and the look of anxiety on his face would become almost pathetic when he tried to do so. When he became interested in talking about his favorite theme, the intrigues and trickery of the city politicians, he would become quite animated, and his depression would almost disappear. He improved somewhat under central galvanization and ergot; but I was unable to benefit him permanently because of the character of his occupation. The firemen are aroused from sleep by the stroke of an electric gong. No other sound awakens them; but when this gong strikes, each man springs up as if the electric current had passed through him. The effect of this upon cerebral circulation and nutrition can easily be conceived. He left me with a promise to change his occupation. He has since died, having fallen a victim to the grippe.

This I consider a somewhat anomalous case of cerebrospinal concussion.

CASE II.—*Sexual hypochondriasis combined with neuritis.*

T. M., a young man who worked in the L. and N. shops as a blacksmith, while lifting a heavy bar of iron, felt a sense of giving away in his lumbar region. He stopped work for that day, but resumed it next day, and continued it for several weeks, in spite of a growing distress in his back.

About three months after the accident he came under my care. I found the lumbar muscles wasted; the patient swayed his shoulders back and protruded his belly, somewhat like a child with pseudo-hypertrophic paralysis. There was tenderness on deep pressure in the lumbar region. Sexual functions much disturbed. He admitted previous sexual excesses. Some vesical weakness. The lumbar muscles responded very slightly to a strong faradic current. Marked insomnia; head paræsthesiæ; fibrillary twitching in the affected muscles, which became more pronounced when he assumed the recumbent posture.

Mentally he was depressed and fearful. The slightest twitching in his back would throw him almost into a frenzy. Pupils sluggish; patellar reflex slightly exaggerated; hang-dog expression of countenance. In spite of warnings he attempted sexual connection, had a premature ejaculation attended by shivering, and came back next day "all broke up." He improved radidly under the use of electricity and sulfonal. I went out of the city during the summer and so lost sight of him.

CASE III.—G. F., a young lady 16 years of age, was on her way to spend the holidays with some friends, on the 24th of December, two years ago. There were two trains that left the city that morning on that road. The first was an accommodation train; the second was an express train that overtook it about thirty miles out. She boarded the first train, and had been on it but a short time when the second train ran into it. She was in the second car from the rear. Engine No. 2 split the hindmost car into halves, knocked off the smokestack and the front end of the boiler, ran a third of the way into the penultimate car, and deluged it with steam. The girl felt a slight jar, followed by a violent crash, which jerked her forward, then backward. She did not strike her spine against anything. Wrapping her cloak about her head, she crawled under a seat, and remained there some time until she was taken out by some one. She was burned about the face, nose, throat and ears by the steam; she did not at any time lose consciousness, and was able to return home that day.

In November, action was brought against the road to recover damages. Two days before the trial, at the recommendation of Dr. Dudley S. Reynolds, her attorney requested me to go out and examine her and be present at the trial as a witness.

I had her go regularly to bed so that I might make a thorough examination. Neither her parents nor her physicians were allowed to tell me anything about the case until I had examined for the objective symptoms. These were as follows: She had the same pathetic look out of her eyes that I noticed in Captain C.'s case. I believe that there is a diagnostic *facies* in such cases.

The patellar reflex was absent on both sides, but no special importance is to be attached to this, for the reason that it is absent in a small percentage of normal individuals, variously estimated by different observers. Hufschmidt has found it wanting in health in 5 per cent.; Eulenburg in

4.20 per cent.; Berger in 1.56 per cent., and Feilkchenfeld in 1.3 per cent.

On looking at me steadily, which was quite irksome to her, her pupils contracted and dilated in curious wise.

The heart was quite irregular in its action, her pulse beating like this —— —— —— —— — — - - - - - - -

When she got up to walk, she spread her feet apart and balanced herself before starting. This showed disturbed co-ordination.

Examination of sensation was negative.

There was no abnormal inequality between the two sides of the body in size.

Dr. Reynolds informed me that she had an involuntary evacuation of the bowels while in his office. This, to my mind, was strongly against its being a case of hysteria.

From her parents and physicians I then obtained the following history: She had made a good recovery from her burns, owing to the excellent care of her attending physician, and had gone on pretty well until June, when she began to be nervous, her sleep was poor, she became very irritable and moody, whereas before the accident she had been unfailingly good-tempered and cheerful. Her memory was feeble, she could not apply herself to anything, she was very low spirited.

I was convinced of the sincerity of the girl by her persistent denial of thrice iterated questions as to symptoms concerning the relative importance of which she could know nothing. The ignorance of her parents of the real points at issue was shown by their dwelling upon the primary symptoms, the burns, etc. Her health had been perfect up to the time of the accident. She weighed some twenty pounds less than usual, but did not look emaciated. Erichsen calls attention to the fact that in such conditions there is wasting of the muscular tissue, but no loss of subcutaneous fat; hence the absence of emaciated appearance.

There was a steadily progressive character about the case very unlike hysteria. There was also an absence of hysterical emotional disturbance. While I was examining her she was perfectly quiet, somewhat listless and sad.

When she went on the witness-stand, she did the best thing possible—broke down and cried. This floored the jury completely.

I asked her afterward, jestingly, if her attorney had not advised her to lachrymate, but she denied it flatly.

She was awarded $10,000 damages. There has been no improvement in her case since the verdict.

CASE IV.—Susan Taylor, aged 35, entered the City Hospital September 28, 1889, when the following history was recorded in the case book: She had a fall on her back several years ago, and complains of great pain in it now at times, is very hysterical (?), and complains of pain all over her body. Examination of her back showed no deformity; complains of pain wherever touched.

I saw her in September, 1890, and obtained her further history: She was of neurotic temperament. She was leaving a street car at the time of the accident, when her dress caught and she fell, striking squarely upon the lumbar region. She felt no marked incovenience at the time, but some months afterward spinal symptoms developed. She felt weak in her knees, was easily tired in her legs, had vague pains in her trunk and legs. Things went on from bad to worse, until at last, when I saw her in the hospital, she had a typical case of locomotor ataxia—loss of patellar reflex, iridoplegia, girdle pain, lightning pains, etc. The morbid process evidently extended to the lateral columns, as there was a decided spastic element present. She had diplopia for several weeks before she died.

No doubt there was a time early in this case when, with such a history, it might readily have been confounded with cerebro-spinal concussion. Locomotor ataxia as the result of trauma is, I believe, very rare.

CASE V.—Edward F., aged 30, an engine-driver, was first seen by me August 27, 1890. He gave the following history: He was in a railway accident September 18, 1888, when he was struck in the epigastrium by the handle of the air-brake. In consequence of this he laid off for six months, during which time he felt constant pain in his stomach, most marked after eating; had no other symptoms. He went to work again. Being born under an unlucky star, he was in a collision, February 14, 1890, between a freight and a passenger train, both going at full speed. Patient was thrown head first through the cab window, and fell in the ditch by the side of the roadbed. The top of the baggagè-car of the train with which he collided fell upon him and imprisoned him for four hours. He struck upon the left side; right fibula was broken just above the ankle; never lost consciousness; no mark of the accident afterward; has fallen off from 187 to 163 pounds; does not look emaciated; characteristic facies. He sleeps, on an average, five hours a night; appetite poor; bowels constipated; sexual functions normal; pain in recti-abdominis muscles—more marked on the left side, worse after eating (from pressure of distended stomach?) and in damp weather; general muscular lassitude; walks like an old man; very temperate; low-spirited at times; loss of business ability. Pupils dilated, uneven; the left pupil is the larger, and responds very slightly to light; left patellar reflex diminished, nearly extinct; right, normal. He talks to me and I talk to him as if he were about ten years old; he "smears" the terminations of words. Thus, wishing to say to me, "Well, sir, I tell you I slept good last night," what he said sounded like this: "We', suh, I te' ye' I slep' goo' las' ni'," pronounced with a slow drawl. He shows what may be called an excess of religiosity; reads the Bible almost constantly, going straight through the long chronologies of those worthies whose simple life-record is that they begat—bad symptom in a workingman. He is in a state of abnormal (?) subjection to his wife.

He has been under treatment for about three months—sulfonal and local and general electrization. He has gained five pounds; sleeps well without any hypnotic; his bowels are regular; appetite good; is stronger; walks more briskly and with more elastic tread; countenance shows more animation; still complains of a little pain in the left side; is able to pursue a light occupation.

THE ACTION OF COLD ON THE PERIPHERAL NERVES.

Dr. G. Alonzo, in the "Riforma Medica," reports the results of his investigations in testing in rabbits the action on the peripheral nerves of cold applied to the skin. Microscopical examination of section of nerves, taken from a position immediately underlying the skin to which the cold was applied, showed a marked change in the nerve structures. The medullary sheath was lifted by the migration of leucocytes from the surrounding blood-vessels and the axis cylinders were distorted and separated by the interposition of the leucocytes. There seemed to be no change in the white substance of Schwann. (Medicinische Revue, November.) B. M.